DEPARTMENT OF INDUSTRIES, LABOUR AND CO-OPERATION

G.O. No. 761, 25th March 1954

Mines—Geological Survey of India—Progress Report for the Field Season, 1952-53—Geology of the Malnad portions of Puttur taluk, South Kanara district by Sri B. R. C. Iyengar, Assistant Geologist—Published.

FOR MYSORE STATE

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Mines—Geological Survey of India—Progress Report for the Field Season, 1952-53—Geology of the Malnad portions of Puttur taluk, South Kanara district by Sri B. R. C. Iyengar, Assistant Geologist—Published.

READ—the following paper :—

From the Deputy Director, Geological Survey of India, Calcutta, dated 12th March 1954,
No. 3377-M/398 (10)/52-53.

Order—No. 761, Industries, Labour and Co-operation, dated 25th March 1954.

The Geological Survey of India report on the geology of the Malnad portions of Puttur taluk, South Kanara district by Sri B. R. C. Iyengar, Assistant Geologist, Geological Survey of India, will be published in the *Fort St. George Gazette*.

(By order of the Governor)

J. M. LOBO PRABHU,
Secretary to Government.

To the Controller of Stationery and Printing (with enclosures) for publication in the *Fort St. George Gazette*.
,, Director of Industries and Commerce, Madras (with enclosures).
Copy to the Superintending Geologist, Southern Circle, Madras-4.
,, the Deputy Director, Geological Survey of India, 27, Chowringhee, Calcutta-13.

ANNEXURE.

PROGRESS REPORT FOR THE FIELD SEASON, 1952-53.

GEOLOGY OF THE MALNAD PORTIONS OF PUTTUR TALUK, SOUTH KANARA DISTRICT, MADRAS STATE.

By Sri B. R. C. Iyengar, Assistant Geologist, Geological Survey of India.

INTRODUCTION.

The field work in South Kanara was commenced during the last week of November 1952, and lasted till the middle of March 1953. Dr. Dey, Superintending Geologist of the Southern Circle, visited me during the month of March 1953, and I am greatly indebted to him for his valuable help and guidance.

The area mapped, about 400 sq. miles in extent, lies between parallels of latitudes 13° 0′ and 12° 42′ and longitudes 75° 15′ and 75° 35′ in topo-sheet 48 P/5 and parts of the topo-sheet 48 P/9, forming a major portion of the Puttur taluk, South Kanara.

PREVIOUS LITERATURE.

There is no earlier report about systematic mapping in South Kanara. In 1923, Mr. G. V. Hobson carried out an examination of the mica occurrences in the South Kanara district, and his report has been published in the Madras Government G.O. No. 1409. In La Touche's Bibliography of Economic Minerals, mention is made about the occurrence of talc (steatite) near Manavalike (12 °47′ : 75° 26′ 30″). In 1935, Dr. P. K. Ghosh examined the corundum occurrences at Uppinangadi and the neighbouring villages in the Puttur tahsil and reported that the deposits are detrital and are found in the alluvium, in the valleys and beds of the tributaries of the Netravati river. The amount obtained according to him, however, was scanty. During the field-season 1946-47, Dr. A. P. Subramaniam carried out investigations of clay deposits in Kasargod, glass sands in Udipi taluk and soapstone in Karkal taluk. Mr A. Damodaran carried out an investigation of the deposits of shell-limestone in South Kanara district during the field-season, 1951-52. In the same season, Mr. S. Krishnaswamy, Geologist, did a reconnaissance survey for minerals in parts of South Kanara district.

PHYSICAL FEATURES, DRAINAGE, COMMUNICATIONS, ETC.

The region presents a continuously varying panorama of grand picturesque scenery. Speaking broadly, the eastern boundary of the district is either the water-shed or the scrap edge of the Westen Ghats whose peaks vary from 3,000 to 6,000 feet in height. The general height of the range may be taken at 2,000 feet towards the north and 3,000 feet further south. From the Ghats spurs run downwards in all directions, one of the longer being the Chibidri ridge which runs from Balaraya Drug to Dharmasthala, a distance of 15 miles. A low spur from the Kudumukh is somewhat peculiarly terminated by a towering conical rock on which stood the Fort of Jamalabad and another large double-peaked rock near Mudbidri rises to the height of 1,100 feet. All over the district there are detached low hills which become less frequent as the coast is approached.

The most interesting mountains of South Kanara is of course the Kudumukh group of three peaks on the highest scarp of a ridge of the Western Ghats facing Beltangadi. The most prominent peak is known as the 'Mukh Head' which is 6,173 feet above sea level, but the two other peaks are higher, that known as the 'Midge Point' being 6,177 feet high, while 'Funk Hill' is as much as 6,207 feet.

The most important of the other peaks of the ghats are Kodashadri (·4400), Balaraya Drug (·4934) over the Bengadi Valley, Kate Gudde (·4534) to the south of Charmadi ghat road, Sisalkal (·3921) over the Shishale Ghat and Subramanya (·5667) overlooking the Bisle Ghat. Amongst isolated hills, Ammedikal rises from low country a little distance off the ghats in the Uppinangadi taluk to a height of 4,261 feet, and the rock of Jamalabad to 1,788 feet.

The rivers of South Kanara run from east to west; the course of the longest is considerably under 100 miles. With the heavy rainfall of the south-west monsoon and the broken nature of the country, the volume of water is very great at times, but the current is then very rapid and even torrential. In the dry weather owing to the rocky character of their beds, the rivers are not usually navigable. Within these limits however, they are very extensively used for bringing produce to the coast.

The two principal rivers which traverse the area under investigation are the Netravati and Kumardhari. The former takes its rise from the ghats to the east of Kudremukh and flows down to Beltangadi Valley past Beltangadi, after which joined by other streams from the ghats, it meets at Uppinangadi, the larger river Kumardhari which comes from Kumaraparvatha near Subramanya. Amongst other streams from the ghats that join Netravati are Neriya *hole*, Sishile *hole*, while Gundia *hole* is one of the largest that join Kumardhari.

Communication between the plains and the country above the ghats is maintained by means of several well graded roads through passes in Western Ghats, besides a number of paths and cattle tracks which, however, are fast falling into disuse. Most of the roads converge on Mangalore. Beginning from south, the road from Madras through Bangalore and Mercara comes down the Sampaje pass and enters South Kanara about 66 miles from Mangalore. After passing through Puttur, it is joined at Mani by the road from Manjurabad which comes down the Shiradi ghat road. Further north, there is a road from Kadur district of Mysore by the Charmadi pass.

Rainfall is very heavy in the district with the result that mountain streams and rivers rise and fall rapidly flowing very swift during the rains. They are fordable only during the dry months.

South Kanara is essentially a forest district. The area surveyed in particular, stimulated by heavy rainfall, is clothed with dense forests of magnificient timber. The great extent of this forest land affords a safe retreat to wild beasts of almost every kind. The ghat forests, in particular, are the home of the bison. Elephants have a permanent home in the extensive forests of Uppinangadi taluk.

Geology.

Though considerable portions of the area, particularly the ghats, are under a thick covering of vegetation, the innumerable streams of South Kanara and the ghat roads expose good sections of the rocks. The highly precipitous areas and thick forests like the Shibaje and the Shishile reserve forest areas can be traversed only with great difficulty.

The following tentative sequence of rocks has been arrived at on the basis of the observations made during the field-season :—

	Recent and Sub-recent.		Laterite, lateritic clays, clays, red soil and dark clayey soil.
Archaeans ..	Intrusives	..	Dolerite, basic and ultrabasic rocks, Charnockite, Granitic gneisses.
Do. ..	Dharwars	..	*Older metamorphic rocks.* Talc-schists, hornblende-schists and banded ferruginous quartzites.

Older metamorphic rocks.—The older metamorphic rocks, constituting the Dharwars, are mostly represented by the banded ferruginous quartzites and less frequently by the talc-schists and hornblende-schists. The banded ferruginous quartzites are highly folded and form a series of ridges. The tops of such ridges are capped by richer ore while compact and not necessarily dense ore may be seen deeper down. Loose blocks of ferruginous quartzites, measuring about 10—15 c.ft. are seen at the tops of ridges.

They are seen in the following reserve forests :—

(1) Dharmasthala Mundaje Reserved Forest, about two miles to the east of Dharmasthala, (2) Konaje and Mujur R.F. to the south of Shiradi, (3) in the Porkal R.F., (4) Shiradi R.F. about two miles to the north-east of Shiradi and (5) in the Shiradi-Shishile R.F., about three miles to the north-east of Shishile. The first two occurrences are larger than the rest.

The Dharmasthala band which starts about two miles to the east of Nidle runs in a N.N.W. trend uninterruptedly towards Mundaje, for over a distance of five miles. It is quite likely that it continues further north into the topo-sheet 48-0/8. It is not, however, of a uniform thickness, being thin at-places (e.g., Manja Gudde) and wider at hill tops (e.g., hills ·1360 and ·767, N.N.E. of Dharmasthala). The westrely dip of these rocks also varies from almost vertical to as low as 30°. The second bigger one which starts about 2½ miles south-east of Shiradi runs along Arbata Gudde (·1045) and continues southwards along the hills ·1080, ·1100 to the east of Ajana and further southwards into the topo-sheet 48–P/10. Probably between Arbata Gudde and Sunkadakatte, it attains the maximum thickness. The westerly dip of this band also varies from 45° to 60°. Less important bands of ferriginous quartzites are seen at (1) Manja Gudde, a segment of which runs along the hill, ·1161 to the east of Mithnaje, (2) to the east of Herike and in the valley between the hills ·1921 and ·2128 in the Shiradi-Shishile reserved forest and (3) to the east of Shibaje in a north-east-south-west direction. A few bands of crushed and highly quartzitic varieties are found in the Porkal and Nidle reserved forest.

Most of the richer ore found along the tops of the ridges is of the lateric gritty type while the 'float' loosely cemented by ferric hydroxide and forming a conglomeratic or breciated variety is not uncommon; the latter type is seen to the north of Sunkadakatte. All these types are apparently due to the recementation of particles of ore of various sizes by secondary ferruginous material.

The banded ferruginous quartzites consist of alternate b of jasper and haematite, the silica being chalcedonic; the indivi layers have thickness varying from the of very thin lines maximum of ½ inch. Under the microscope, a few grains of nolite are seen as accessory constituent. In the less ferrugi types, hornblende, augite and accessory topaz are also seen.

Talc-schists.—Next in importance among the Dhar are the talc-schists occurring mostly as isolated patches in biotite gneisses; the biggest outcrop is seen to the immec west of Beltangadi. It is of a dark greyish fibrous variety under the microscope shows signs of alteration to chlorite. other minerals found in the rock are brown hornblende, actin and sometimes tremolite.

Hornblende-schists.—Outcrops of hornblende-schists are few and far between. Mention may, however, be made of a occurrence of amphibolite to the south-east of ·235, the consisting mainly of green hornblende, accessory sillimanite a few grains of topaz.

Granitic gneisses.—By far the most extensive rock form in the area is the biotite-gneiss. The summits and slopes of Western Ghats like the Puspagiri, Kadamkal and Jamalabad ex huge outcrops, but as one proceeds westwards, they are grad covered over by vegetation and soil. Except for local vari (e.g., west of Kutrapadi) they have a general north-west to south to north-north-west to south-south-east trend parallel to the c tion of the Western Ghats and dip westwards on the average at The foliation direction generally conforms with the strike. Prin gneissic banding is common and the rock varies from coarse gn granulite to highly foliated gneiss.

They consist essentially of common vitreous quartz and to intermediate feldspars, the latter sometimes showing cloc and decomposition; microcline is not uncommon. The ferromagnesian mineral is biotite while muscovite is less frequ green mica is sometimes seen (e.g., foot-hill ·1159). The acces minerals include apatite, spinel, diopside and rarely zoisite; garnet is generally abundant.

Charnockite.—Except for a small outcrop of acid charno in the hill ·845, south of Bandi *hole*, charnockites are sel seen in the area.

Basic and ultra-basic rocks.—The biotite gneisses are profu intruded by basic and ultra-basic sills and dykes giving rise to more or less, narrow ridges, generally low but often rising to he of 200 feet above the gneissic country. Mention may be mad two such long sills, one of them starting at the south-east co to the topo-sheet 48 P/5 and running north-west through Nu tila for over a distance of eight miles, while the second one sta of the north of Kuindila runs north-west through Nyayatarpa over a distance of eight miles; the latter is likely to cont further north-west. A cluster of highly folded and branching d is seen in the Pudnur Reserved Forest. The majority of intrusives are sills running generally north-west to south-eas conformity with trend of the major rock types. Some of ther also seen striking north-east-south-west while very few run west. The intrusives are less active as one proceeds westwa

Spheroidal weathering is typical of these intrusives, cov the summits and slopes of the ridges with the rounded boulder the surrounding country with dark soil.

Considerable variation is seen on these rocks both as re the texture and mineral composition, the texture varying fine granulitic to doleritic and porphyritic. They range in co sition from pyroxenites to amphibolites. Except for a few pr nent dolerites, they are all grouped under "Pyroxine granulite

The ultrabasic varieties of these dyke-rocks are essen pyroxenites made up almost entirely of either hypersthen augite ranging from panidiomorphic to granulitic texture; pyroxene is often poikilitic towards the basic feldspars (approa labrodorite), e.g., the dyke along Ujre road at Netravati R se The accessory minerals generally found are biotite, secon hornblende and a few grains of apatite.

The majority of the intrusive rocks fall in the basic g showing in general a granulitic texture which may include fine coarse. The essential ferromagnesian minerals include h thene, augite, hornblende and diopside in varying proportions. often hornblende predominates over the other minerals and rock can be considered as hornblende-granulite. The plagic feldspars are intermediate to basic while andesine and labrad are not uncommon. Granular aggregates of quartz are some seen in considerable quantity. The accessory minerals in biotite, apatite, zoisite, magnetite and epidote. Secondary h blende after hypersthene is very frequent. Pink garnet, some appearing as phenocrysts is a common associate.

A few outcrops of more acid porphyritic types are also (e.g., west of hill ·1212, north of Neriya). The rocks are com of phenocrysts of very feebly pleochroic and highly altered hy thene, the groundmass being made up of an aggregate of h hornblende and quartz with accessory biotite and magnetite.

The cluster of highly folded and branching dykes in Pudnur Reserved Forest referred to earlier, is intersting. U the other intrusive rocks, they consist of feebly pleochroic blende and basic feldspar. These are probably secondary the original pyroxene granulites. The accessory mineral mainly a few grains of quartz and magnetite.

The two long sills, referred to earlier, and few smaller ones represent the dolerite type of intrusive rock showing ophitic to sub-ophitic texture; some of them are very fine grained apparently due to sudden chilling. The rock consists essentially of augite and feldspars (andesine labradorite) while quartz, magnetite, biotite and garnet are the accessory minerals. Hornblende is often seen in considerable quantity.

A more altered pyroxene dolerite from milestone 12/2 along Uppinangadi-Beltangadi road shows beautiful keliphitic borders composed of mainly hornblende (?), developed between the feldspars and magnetite. The other minerals seen in the rock are augite and biotite.

Recent and sub-recent.—Around Kokkada, Golithattu, north of Nelliyadi, Kunthur, Kaniyur, Alankar and Koila, considerable area is capped by laterites giving more or less a flat appearance and at places giving rise to red soil on weathering. A few occurrences of clay were seen around Ujre, Koyyur and Alankar.

Structural features.—The granitic gneisses constituting the major formation of the area has a general north-west–south-east to north-north-west-south-south east trend in consonance with the general trend of the Western Ghats, and dip westwards on the average at 45°. There are, however, local variations, as for example, a pitching anticlinal fold about a mile to the north-west of Kutrapadi.

The highly folded dyke rocks of Pudur Reserve Forests indicate a pitching syncline.

Economic Geology.

The following mineral occurrences have been recorded in the area surveyed :—

1. *Iron-ore.*—By far the most important economic mineral occurring in the area is the iron-ore. It is well known that iron-smelting was carried out by ancients in the Puttur taluk; even to-day slag heaps can be seen at a few places. These iron-ore occurences are associated with ferruginous quartzites which are fairly thick at the two places mentioned before. Though at places the bands grow richer in iron content due to weathing and leaching away of silica, it is doubtful if the same rich quantity of the ore continues deep down.

The following are analyses of samples collected from the surface, from the localities mentioned against each :—

Locality.	*Sample No.*	*Insoluble.* PER CENT.	*Total iron as Fe* PER CENT.	*P.* PER CENT.	*S.* PER CENT.
Along Charmadi road near Mundaje.	SK18	39·10	39·36		
From hill ·973 near Dharmasthala.	SK27	44·40	38·47		
From hill ·1360 near Dharmasthala.	SK29	49·98	34·33		
South of hill ·1152 near Dharmasthala.	SK34	49·70	35·02		
From hill ·767	SK38	49·02	32·85		
From hill ·823	SK53	49·50	34·03		
South end of Ajjimale ..	SK57	79·32	10·06		
North of 100 and West of Varkal Gudde.	SK60	50·04	32·05		
From the valley between ·2128 and 2007.	SK73	49·30	34·03		
A mile north-east of Shiradi.	SK74	34·22	41·43		
From hill east of Kirnadka.	SK80	2·62	57·88	0·103	0·023
From hill ·1180	SK95*a*	12·30	54·75		
3 furlongs south of ·1180.	SK95b	21·48	45·75		
6 furlongs south of ·1180.	SK95c	7·94	50·60		
North of hill ·1100, east of Ajana.	SK96	5·28	55·63	0·154	0·022
North of Sunkadakatte ..	SK97	30·95	44·68		

It may be useful to mention here a few analyses o picked iron-ore samples collected by Mr. S. Krishnaswamy, Geologist, and stated in his Progress Report for the year 1951–52.

Locality.	*Fe.* PER CENT.	*Phosphorous.* PER CENT.	*Manganese.* PER CENT.	*Sulphur.* PER CENT.
From Yenakal R.F. on the south flanks of the Muthlaje Bail.	52·22	0·044	0·192	0·048
6 furlongs east of Ajana Bail.	41·25	0·046	4 64	0·026
Samples sent by Mr. Amritha Rao, Deputy Tahsildar, from Nidle and Konaje R.F.	51·35	0·0410	0·0420	0·035
	56·30	0·011	0·172	0·024
	53·36	0·028	0 066	0·051
Eastern flanks of hill ·543 south-west of Chilimetturu village.	56·83	0·024	0·20	0·027

It is apparent from the above analyses that between the two more important iron-ore occurrences, that found in the Mujur Reserve Forest is tolerably good. The phosphorous content of these ores is variable. The ore band has an average width of about six feet and can be traced for a distance of three miles. These ferruginous quartzites are likely to extend further north as well as south of the area mapped and detailed prospecting is necessary to assess the quality and quantity of ore available.

2. *Clays.*—Well-sections around Ujre and stream-sections around Koyyur show indications of a probable occurrence of china clay around those villages. Such indications are seen over an area of about one square mile at each place. These can only be confirmed after trial borings. Smaller, unimportant occurrences of china clay are seen here and there.

At Alankaru, a group of about 30 families live on pottery. Yellowish-white clay of good plasticity is seen on the banks of Kumardhari river over an area of a square mile and at a depth of about 3 to 4 feet. Overlying the clay is a recently deposited pebble bed. The average thickness of the clay bed is about five feet.

3. *Corundum*—Occurrences of corundum around Kemmaru is known for a long time. It is an alluvial type of deposit found along the banks of a stream. All the available material seems to have been removed and the chances of winning more are remote. A few pits put down by earlier workers can still be seen.

4. *Building material.*—The granite gneisses and the laterite can best be used as building material.

Appendix I.

Locality Index.

Name of the locality.	*Latitude.* °	′	″	*Longitude.* °	′	″
Ajana	12	46		75	32	
Arabata Gudde	12	47	30	75	32	
Alankaru	12	46		75	21	
Bandi Hole	12	53		75	29	30
Beltangadi	12	59	30	75	17	30
Dharmastala	12	57		75	23	
Golitattu	12	51		75	22	30
Harike	12	56		75	32	30
Kaniyur	12	41		75	19	
Kemmaru	12	49		75	20	30
Kokkada	12	52		75	24	30
Koila	12	47		75	18	
Kuindila	12	51		75	20	
Kuntur	12	47		75	22	30
Kutrapadi	12	46		75	27	30
Manjagudde	12	57		75	24	
Mithanaje	12	50		75	32	
Mundaje	13	2		75	23	
Nelliyadi	12	49		75	23	30
Neriya	13	0		75	27	30
Nidle	12	54		75	24	
Nujibaltila	12	48		75	28	
Nyayatarpu	12	56		75	16	30
Shiradi	12	49	30	75	32	
Shishile	12	54		75	30	
Sunkadakatte	12	44		75	32	30
Ujre	12	59	45	75	19	30
Uppinangadi	12	50		75	15	

No 3377 M/898(10)52/53 B.R.C.I. Calcutta 13, the 12th March, 1954

22631

From

The DEPUTY DIRECTOR,
Geological Survey of India,
27, Chowringhee,

To

The Secretary to the Government of Madras,
Department of Industries, Labour an Co-operation, Fort.St.George, MADRAS

Sir,

I am forwarding herewith, ~~a copy~~ of the following report for your information and record.

Kindly acknowledge receipt.

Title of the report :

Progress report for the Field Season 1952-53. Geology of the Malnad portion of Puttur Taluk South Kanara district, Madras State", by Mr. B.R.C.Iyengar, Assistant Geologist, Geological Survey of India.

Yours faithfully,

for Deputy Director,
Geological Survey of India

(one copy is complete with the geol. maps)

I/G-70. s/10/3/54

P. T. O.

No ...../..... Calcutta-13, the.....195

Copy, together with a copy of the report is forwarded for information to.....

The receipt may kindly be acknowledged.

Y.L.R.(V)

Letter No. 22631G/52-1 Dt 19.3.52

To

The Director,
G.S.I.,
27. Chowringhee, Calcutta

Sir,

Sub:- Mines. G.S.I Progress Reports for the field Season 1952-53 - Geology of the Malvad portion of Puttur Taluk, South Kanara Dist by Sri B.R.C Iyengar

Ref:- Your letter No. 3377 M/398(10)/52/ B.R.G.I dated 12/3/52

I am directed to acknowledge the three copies of the reports sent with your letter cited

18/3/54 6 18/3/54 Y.T.

P.T.O

Note:- Afterwards a note on the result of the report will be submitted

I.L.C.(G)

Mines - G.S.I. * Progress Report for the Field Season 1952-53 - Geology of the Malnad portions of Puttur Taluk, South Kanara District by Sri B.R.C. Iyengar, Asst. Geologist - Published.

- -

Read:-

From the Dy.Director, G.S.I., Calcutta
No.3377 M/398(10)/52/53 dated 12.3.54.

G.O.MS.NO. 761 DATED 25.3.54

- -

The G.S.I. report on the geology of the Malnad portions of Puttur Taluk, South Kanara D by Sri B.R.C. Iyengar, Asst. Geologist, G.S.I. be published in the Fort St. George Gazette.

24.3.54.

To the C.S. & P. for publication ~~of the report~~ in the Fort St. George Gazette.
To the D.I.& C. (with encls.)
Copy to Superintending Geologist, Southern Circle, Madras-4
Copy to the Dy. Director, G.S.I., 27, Chowringhee, Calcutta-13.

I.L.C.(G)

Extract of C.B

1. S.N.T.
2. Date of entry in the Register 8.4.54
3. Subject — Mines - G.S.I Report on the geology of the ~~portion~~ Malwad portion of Pattan Tk S. Kanara Dist: Publishing of — further action.
4. Ref 2rb31 G/54
5. No. and date of G.O authorising the entry — G.O.M.S No. 761 I.L.C 25.3.54
6. Date when further action is to be taken 25.4.54

35372G
26/4/54

SECRETARY
28 APR 1954
& COY

D.I.G.(G)

Memo No. 35372G/54/- Dt. 28/4/54

Mines – G.S.I. Progress Report for the field season 1952–53 Geology of the Mahnad portion of Pudukottai Taluk, South Kanara Dist. by Sri B.R.S. Iyengar, Asst. Geologist – Publication of.

Ref:– G.O Ms. No. 761. D.I.G Dt 25.3

The Controller of Stationery and Printing Madras is requested to expedite the proof copies of the G.O. mentioned above.

To The Controller of Stationery & Printing, Madras

R.D 30/5/54

27/4/54

27/4/54

Letter No: 35372 G/54-2 dt 4/5/54

To The Superintending
Geologist
G.S.I.,
Southern Circle,
Madras 4 (Nilgiris)

Sir,

Subject: Mines - G.S.I. -
Progress Report for the field
season 1952-53 - Geology
of the Madurai portions of
Pattur Taluk, S. Kanara dt
by Sri B.R.C. Iyengar, Asst
Geologist - Publication of
-

I am directed to

enclose two proof copies of the report mentioned above and to request that they may be returned after making corrections wherever necessary.

Yours

From
H.J. Stooks, I.A.S.,
Controller of Stationery
and Printing, Madras-1.

To
The Secretary to Government,
Department of Industries, Labour and Co-operation,
Fort St. George, Madras.

No.Pr.47144/54-Gaz., dated 12th May 1954.

Sir,

Sub: Mines - Geological Survey of India-Progress Report for the field season 1952-53 - Geology of the Malnad portions of Puttur Taluk, South Kanara District by Sri B.R.C. Iyengar, Assistant Geologist - Supply of proof copy.

Ref: (1) G.O. Ms. No.761, Department of Industries, Labour and Co-operati dated 25-3-1954.
(2) Memorandum No.35372-G-54-1, I.L.C., dated 28-4-1954.

Proof of the Report referred to in the Memorandum second cited was sent for approval on 30-4-54 under invoice No.31566.

for Controller.

As / The proof copies have been received and sent to I.L.C.(G) for checking. The return of the proof may be awaited till 2.6.54

B4R.P.

GOVERNMENT OF INDIA

No. 1097/56(3) Dated: 22nd May, 1954.

From

Dr. A.K. Dey, Ph.D.,
Superintending Geologist,
Geological Survey of India,
Southern Circle, Madras-4.

To

The Secretary to the Govt
ment of Madras,
Department of Industries,
Labour and Co-operation
Fort St. George, Madras-9

Dear Sir,

Sub: "Progress Report for the field-season 1952-53 - Geology of the Malnad portions of Puthur taluk, South Kanara district" by Mr. B.R.C. Iyengar, Assistant Geologist - Proof copies - Correction of.

With reference to your letter No. 35372 G/54-2 dated the 4th May, 1954, I am herewith return two proof copies of the above report, duly checked and corrected, together with the original report.

Kindly acknowledge receipt.

Yours faithfully,

(A.K. Dey)
Superintending Geologist,
Geological Survey of India.

Encl: As above.

ARS

Letter No. 35372 G/54-3 dt 31/5/54

To

The Superintending Geologist
G.S.I., Southern Circle
Madras.4

Sub:- G.S.I. P.R. for the field season 1952-53 - Geology of the Malnad portions of Puttur Taluk, S.Kanara Dist. by Sri B.R.C Iyengar.

Ref:- your letter No. 1097/52 dated 22/5/54

I am directed to acknowledge the receipt of the letter cited together with its enclosure.

Yours faithfully,

28/5/54 G

28/5/54

II

DLO(G)

Memo No. 35372 G/54-4 — 31/5/54

Sub:- G.S.I. Progress Report on the field season 1952-53 - Geology of the Malnad portions of Puttur Taluk S.Kanara Dist by Sri B.R.C. Iyengar - Printing and Publication

onveyed to the Controller of Stationery
nd Printing, Madras. He is
equested to publish the G.O in the
.S. G. G. and intimate the fact to the
ovt. He is also requested to send
~~print the number of copies~~ copies of the G.O as per
e Press slip and Supplying Team to
this Dept at an early date, retaining
e fifty copies intended for sale to
e public.

514684 4
4145

From

H.J. Stocks, I.A.S.,
ntroller of Stationery
and Printing, Madras-1.

To

The Secretary to Government,
Department of Industries, Labour and Co-
operation, Fort St. George, Madras.

Pr. No. 59516/54 Gazette dated 13-6-'54.

Sir,

18 JUN 1954

Sub:- Mines - Geological Survey of India - Progress Report for the Field Season 1952-'53 - Geology of the Malwad portions of Puthur Taluk, South Kanara District by Sri B.R.C. Iyengar. Publication - Fact intimated.

Ref:- Memorandum No. 35372 G/54-4 I.L. and C. dated 31-5-'54.

The Geological report mentioned above was published at pages 1-3 of the Supplement to Part I of the Fort St. George Gazette, dated 9-6-'54.

for Controller.

C.G.R. 15.6.

Submitted for perusal.
Copies of G.O.s called for in the Memo at ¶ 2 above may be awaited till 12/7/54

A.P.

W.r.t orders at A on p13 above, a draft Memo to the C.S.&P. is putup.

Memo No. 35372 G/52-5 dt 26/6/54

Mines - G.S.I. - Progress report for the field season 1952-5 geology of the Malnad portions of Sirsi Taluk, S. Kanara dist by Sri. B. R. C. Iyengar - Printing of -

Ref :- Govt. Memo No. 35372 G/52 dated 31/5/54

(II) From the Controller of Stationery and Printing Madras No. 59516/54 - Gazette dt 12/6/54

The Controller of Stationery and Printing is requested to state

11 26

when the printed copies of
G.O. called for in the Memo
cited may be expected

To
The Controller
of Stationary
and Printing
Madras

N R. 19.

27 7

GLC CJ Dept.

Memo No 35'372 J/54 - 6 dt. 20.7.54

Sub: Mines. G.S.I. Progress Report for the Field Season 1952-53 geology of the Malvad portion Puttur Taluk, S. Kanara Dt. by Sri B.R.C. Iyengar - Printing of

Ref: govt Memo No 35'372 G/54-5 GLC dt. 26-6-54.

The Controller of Stationery & Printing is requested to state before 6.8. when the ~~finally~~ printed copies ~~the~~ G.O. No. 761 GLC dt. 25.3.54 may be expected

~~30~~ 10.7.54

20/7/54

✓ P.S. of (5)

The Controller of Stationery ✓ Printing Madras

N.R. 6.8.54.

Proof rec'd. from Press on 23/7/54

Proof of G.O.No. 761 File dated 25/3/54 Returned to the Press on 28/7/54

A

From
H.J. Stooks, I.A.S.,
Controller of Stationery
and Printing, Madras-1.

To
The Secretary to Government,
Department of Industries, Labour
and Co-operation, Fort St. George,
Madras.

No.Pr.81073/545-Pub. dated 2-8-1954.

SECOND ASSISTANT SECRETARY
4 AUG 1954
DEPARTMENT OF INDUSTRIES, LABOUR AND CO-OPERATION

64871 J

Sir,

Sub: Mines - Geological Survey of India - Progress Report for the field season 1952-53 - Geology of the malnad portions of Puttur Taluk, South Kanara District by Sri B.R.C. Iyengar - Proofs sent.

Ref: Government Memo.No.35372-J/54-6 dated 20-7-1954.

--

The proof copies relating to the G.O.No.761 I.L.C. dated 25-3-54 have been sent to Government on 21-7-54 for approval.

2 On receipt of the proof copies duly approved the copies will be printed and supplied.

for Controller.

sv1.2.8.

HHS A above — The proof copies have been returned to the Press, after correction. Printed copies may be awaited till 31/8/54

I.L.C (J) 3/54 Dept. 21

Memo No: 35372 J/54-7 - dt. 29-8-54

Sub: Mines - G.S.9 Progress Report for the Field Season 1952-53 Geology of the Malnad portions of Puttur Taluk, South Kanara district by Sri B.R.C. Iyengar - Printing of

Ref: From the C.S. & P. Mad Pr. 81703/545 Pub. dt. 2-8-54.

The Proof copies of G.O. No: 71 I.L.C dt. 25-3-54 were returned the Press on 2-8-54. The C.S & P is requested to state before 15-9-54 when the printed copies of the G.O. may be expected.

21/8/54

To

The Controller of Stationary and printing,

Madras.

N.R. 15-9-54

I.L.C. (Ex) Deptt

Memo No. 35372 J/54-8 dt. 16-9-54

Sub: Mines – G.S.I. Prog Report for the Field Season 1952- Geology of the Malnad portions of Puttur Taluk, South Kanara District by Sri B.R.C. Iyengar – Printing of.

Ref: ~~This Deptt~~ Govt Memo No. 35372 dated 2-9-54.

From the C.S. & P, Madras

No. Pr. 81703/545 – pub. dt. 2-8-54.

The Controller of Stationery and printing is requested to state when the printed Copies of the G.O called for in the Memo

~~text~~ may be expected.

R 19/9 6/15-9-54

A/15/9/54

To

Sd 16/9

The C. S. & P.,

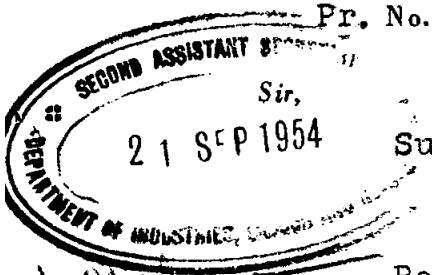
Madras.

R. 4-10-54

From
H.J. Stooks, I.A.S.,
Controller of Stationery
and Printing, Madras-1.

The Secretary to Government,
Department of Industries, Labour &
Cooperation, Fort St. George, Madras

Pr. No.98963/676-Pub dated 17-9-1954



78393 J
21/9/54

Sir,

Sub: Mines - Geological Survey of India - Progress Report for the field season 1952-53 - Geology of the Malnad portions of the Puttur Taluk, South Kanara District by Sri B.R.C. Iyengar - Printed copies - Regarding.

Ref: (1) Government Memo No.35372 J/54-7 dated 2-9-54
(2) Government Memo No.35372 J/54-8 dated 16-9-54

The copies of G.O.No.761, Industries, Labour & Co-operation, dated 25-3-54 are ready for supply.

2 As soon as the reproductions of the maps relating to the above report are received from Assistant Director of Survey, Triplicane, the final copies will be supplied.

The maps ~~are~~ were sent for reproduction on 24-8-54.

for Controller.

Copy to the Assistant Director of Survey, Triplicane, Madras.

JI.18.9.

A.S N.R. 20/10/54 A 23/9/54

(sd) G.F. Amalanathan
for Controller.

From
H.J. Stooks, I.A.S.,
Controller of Stationery
and Printing, Madras-1.

To
The Secretary to Government,
Department of Industries, Labour an
Co-operation, Fort St. George, Madr

Pr. No. 106344/744 Pub, dated 29-9-1954.

82676

8/10/54

Sir,

Sub:- Mines - Geological Survey of India - Progress Report for the Field Season 1952-'53 - Geology of the Malnad portio of Puttur Taluk, South Kanara District by Sri B.R.C. Iyengar - Printing of.

Ref:- This office letter Pr. No. 98963/676 Pub, dated 16-9-195

In continuation of this office letter cited, I am forwarding herewith a copy of letter No. L. Dis. 10173/54, dated 22-9-1954 from the Assistant Director of Survey, Central Survey Office, Madras and two Maps for taking further action in the matter.

for Controller.

Enclosed:- (1) Copy of letter referred to
(2) Two Maps.

C.G.R.1.10.

Copy of the letter No. L. Dis. 10173/54, dated 22-9-1954 from Sri P. Raman Nair, B.A., Assistant Director of Survey, Central Surv Office, Madras-5, to the Superintendent, Government Press, Madras.

Sub:- PRINTING - Maps - Geological Survey of India - Progress Report for the field season 1952-'53 - Regarding.
Ref:- Your letter Pr. No. 143A/71/Pub. dated 20-8-1954.

The two Survey of India sheets received with your letter cited are not suitable for reproduction, as they are coloured. Hence th have to be drawn afresh.

2 They will be drawn fresh suitably symbolising them for being printed in black and white. The contour details would in that cas have to be deleted.

3 The cost of so redrawing the two sheets, reproducing to scale, printing in black and white and supplying 100 sets of copies works to Rs.945/- (Rs.820 for redrawing and Rs.125/- for reproducing and printing.). Every additional 100 sets would cost only Rs.12/- ext

4 The figures quoted above are only in the nature of estimates, actual outlay entailed which will be known only on compeion of the work being always debitable.

5 The 2 Survey of India sheets received with your letter cited a returned herewith. They may be retransmitted to this office along with your letter intimating acceptance of the conditions mentioned above and the estimated cost furnished to enable me to take further action in the matter.

Enclosed:- 2 Survey of India sheets.

ILC (S) Dept.

Memo No.35372 J/54- 9 dated 18/10/54

Sub: Mines - G.S.I - Progress Rep for the Field Season 1952-53 Geology of the Malnad portion of the Puttur taluk, South Kanara District by Sri B.R.C Iyengar - Printing of

Ref: From the C.S.&.P.Madras Pr.N 106344 ~~No.106344~~/744 Pub dated 29-9-54

**

The C.S.P. is informed that the G.S.I. maps referred to in his reference cited need not be printed. He is requested to expedite the despatch of the printed copies of G.O.No.761 ILC dated 25-3-54 (without maps) with reference to Govt.Memo No.35372 G/54-4 ILC dated 31-5-54.

15/10/54 15-10-54

17/10/54

18/10

(A)

CENTRAL DESPATCH BRANCH

Date 20/X/1954. Despatched (S)

pp 11-12 ahm

To the C.S.&.P. Madras.

N.R.14-11-54

F - 398 (10) BRCI/52-53

GEOLOGICAL SURVEY OF INDIA

PROGRESS REPORT FOR THE FIELD-SEASON 1952—53

GEOLOGY OF THE MALNAD PORTIONS OF PUTTUR TALUK, SOUTH KANARA DISTRICT, MADRAS STATE

By

B. R. C. IYENGAR,
Assistant Geologist, Geological Survey of India.

Progress Report for the field-season 1952-5

GEOLOGY OF THE MALNAD PORTIONS OF PUTTUR TAL SOUTH KANARA DISTRICT, MADRAS STATE

By

B.R.C. Iyengar, B.Sc.(Hons.), A.I.I.S.C.,
Assistant Geologist, Geological Survey of In

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Progress Report for the field-season 1952-53.

GEOLOGY OF THE MALNAD PORTIONS OF PUTTUR TALUK, SOUTH KANARA DISTRICT, MADRAS STATE

By

B.R.C. Iyengar, B.Sc.(Hons.), A.I.I.Sc.,
Assistant Geologist, Geological Survey of India.

****

INTRODUCTION

The field work in South Kanara was commenced duri the last week of November, 1952, and lasted till the middle of March, 1953. Dr. Dey, Superintending Geologis of the Southern Circle, visited me during the month of March, 1953, and I am greatly indebted to him for his valuable help and guidance.

The area mapped, about 400 sq. miles in extent, lies between parallels of latitudes 13°0' and 12°42' and longitudes 75°15' and 75°35', in topo-sheet 48 P/5 and parts of the topo-sheet 48 P/9, forming a major portion of the Puttur taluk, South Kanara.

PREVIOUS LITERATURE

There is no earlier report about systematic mappi in South Kanara. In 1923, Mr. G.V. Hobson carried out a examination of the mica occurrences in the South Kanara district, and his report has been published in the Madra Government G.O. No. 1409. In La Touche's Bibliography o Economic Minerals, mention is made about the occurrence of talc (steatite) near Manavalike (12°47' : 75°26'30"). In 1935, Dr. P.K. Ghosh examined the corundum occurrence at Uppinangadi and the neighbouring villages in the Puttur tahsil and reported that the deposits are detrita and are found in the alluvium, in the valleys and beds o the tributaries of the Netravati river. The amount obtained according to him, however, was scanty. During the field-season 1946-47, Dr. A.P. Subramaniam carried out investigations of clay deposits in Kasargod, glass sands in Udipi taluk and soapstone in Karkal taluk. Mr. A. Damodaran carried out an investigation of the deposits of shell-limestone in South Kanara district during the field-season 1951-52. In the same season, Mr. S. Krishnaswamy, Geologist, did a reconnaissance survey for minerals in parts of South Kanara district.

PHYSICAL FEATURES, DRAINAGE, COMMUNICATIONS, ETC.

The region presents a continuously varying panorama of grand picturesque scenery. Speaking broadly, the eastern boundary of the district is either the wate shed or the scrap edge of the Western Ghats whose peaks vary from 3000 to 6000 feet in height. The general height of the range may be taken at 2000 feet towards the north and 3000 feet further south. From the Ghats spurs run downwards in all directions, one of the longer being the Chibidri ridge which runs from Balaray Drug to Dharmasthala, a distance of 15 miles. A low spur from the Kuduremukh is somewhat peculiarly terminated by a towering conical rock on which stood the Fort of Jamalabad and another large double-peaked rock

ar Mudbidri rises to the height of 1100 feet. All over
e district there are detached low hills which become
less frequent as the coast is approached.

The most interesting mountains of South Kanara is of course the Kudremukh group of three peaks on the highest scarp of a ridge of the Western Ghats facing Beltangadi. The most prominent peak is known as the 'Lukh Head' which is 6173 feet above sea level, but the two other peaks are higher, that known as the 'Ridge Point' being 6177 feet high, while 'Funk Hill' is as much as 6207 feet.

The most important of the other peaks of the ghats are Kodashadri (.4400), Balaraya Drug (.4934) over the Bengadi Valley, Kate Gudde (.4534) to the south of Charmadi ghat road, Sisalkal (.3921) over the Shishale Ghat and Subramanya (.5667) overlooking the Bisle Ghat. Amongst isolated hills, Ammedikal rises from low country a little distance off the ghats in the Uppinangadi taluk to a height of 4261 feet, and the rock of Jamalabad to 1788 feet.

The rivers of South Kanara run from east to west; the course of the longest is considerably under 100 miles. With the heavy rainfall of the South-west monsoon and the broken nature of the country, the volume of water is very great at times, but the current is then very rapid and even torrential. In the dry weather, owing to the rocky character of their beds, the rivers are not usually navigable. Within these limits however, they are very extensively used for bringing produce to the coast.

The two principal rivers which traverse the area under investigation are the Netravati and Kumardhari. The former takes its rise from the ghats to the east of Kudremukh and flows down to Beltangadi Valley past Beltangadi, after which joined by other streams from the ghats, it meets at Uppinangadi, the larger river Kumardhari which comes from Kumaraparvatha near Subramanya. Amongst other streams from the ghats that join Netravati are Neriya hole, Sishile hole, while Gundia hole is one of the largest that join Kumardhari.

Communication between the plains and the country above the ghats is maintained by means of several well graded roads through passes in Western Ghats, besides a number of paths and cattle tracks which, however, are fast falling into disuse. Most of the roads converge on Mangalore. Beginning from south, the road from Madras through Bangalore and Mercara comes down the Sampaje Pass and enters South Kanara about 66 miles from Mangalore. After passing through Puttur it is joined at Mani by the road from Manjurabad which comes down the Shiradi ghat road. Further north, there is a road from Kadur district of Mysore by the Charmadi pass.

Rainfall is very heavy in the district with the result that mountain streams and rivers rise and fall rapidly, flowing very swift during the rains. They are fordable only during the dry months.

South Kanara is essentially a forest district. The area surveyed in particular stimulated by heavy rainfall is clothed with dense forests of magnificient timber The great extent of this forest land affords a safe retreat to wild beasts of almost every kind. The ghat forests, in particular, are the home of the bison. Elephants have a permanent home in the extensive forests

Though considerable portions of the area, particularly the ghats, are under a thick covering of vegetation, the innumerable streams of South Kanara and the ghat roads exposed good sections of the rocks. The highly precipitous areas and thick forests like the Shibaje and the Shishile reserve forest areas can be traversed only with great difficulty.

The following tentative sequence of rocks has been arrived at on the basis of the observations made during the field-season:-

	Recent and Sub-recent	Laterite, lateritic clays, clay red soil and dark clayey soil
Archaeans	Intrusives	Dolerite, basic and ultrabasic rocks, Charnockite, Granitic gneisses
	Dharwars	Older metamorphic rocks: Talc-schists, hornblende-schists and banded ferruginous quartzites.

Older metamorphic rocks.- The older metamorphic rocks, constituting the Dharwars, are mostly represented by the banded ferruginous quartzites and less frequently by the talc-schists and hornblende-schists. The banded ferruginous quartzites are highly folded and form a series of ridges. The tops of such ridges are capped by richer ore while compact and not necessarily dense ore may be seen deeper down. Loose blocks of ferruginous quartzites measuring about 10-15 c.ft., are seen at the tops of ridges.

They are seen in the following reserve forests:- (1) Dharmasthala Mundaje R.F., about two miles to the east of Dharmasthala, (2) Konaje and Mujur R.F. to the south of Shiradi, (3) in the Porkal R.F., (4) Shiradi R.F. about two miles to the north-east of Shiradi and (5) in the Shiradi-Shishile R.F., about three miles to the north-east of Shishile. The first two occurrences are larger than the rest.

The Dharmasthala band which starts about two miles to the east of Nidle runs in a N.N.W. trend uninterruptedly towards Mundaje, for over a distance of five miles. It is quite likely that it continues further north into the topo-sheet 48 O/8. It is not, however, of a uniform thickness, being thin at places (e.g., Manja Gudde) and wider at hill tops (e.g., hills .1360 and .767 N.N.E. of Dharmasthala). The westerly dip of these rocks also varies from almost vertical to as low as 30°. The second, bigger one which starts about 2½ miles south-east of Shiradi runs along Arbata Gudde (.1045) and continues southwards along the hills .1080, .1100 to the east of Ajana and further southwards into the topo-sheet 48 P/10. Probably between Arbata Gudde and Sunkadakatte, it attains the maximum thickness. The westerly dip of this band also varies from 45° to 60°. Less important bands of ferruginous quartzites are seen at (1) Manja Gudde a segment of which runs along the hill .1161 to the east of Mithnaje, (2) to the east of Herike and in the valley between the hills .1921 and .2128 in the Shiradi-Shishile R.F. and (3) to the east of Shibaje in a N.E.-S.W. direction. A few bands of crushed and highly quartzitic varieties are found in the Porkal and Nidle R.F.

Most of the richer ore found along the tops of the ridges is of the lateritic gritty type while the 'float' loosely cemented by ferric hydroxide and forming a conglomeratic or brecciated variety is not uncommon; the latter type is seen to the north of Sunkadakatte. All these types are apparently due to the recementation of particles of ore of various sizes by secondary ferruginous material.

The banded ferruginous quartzites consist of alternate bands of jasper and haematite, the silica being chalcedonic; the individual layers have thickness varying from that of very thin lines to a maximum of ½ inch. Under the microscope a few grains of actinolite are seen as accessory constituent. In the less ferruginous types, hornblende, augite and accessory topaz are also seen.

Talc-schists.- Next in importance among the Dharwar are the talc-schists occurring mostly as isolated patches in the biotite gneisses; the biggest outcrop is seen to the immediate west of Beltangadi. It is of a dark greyish fibrous variety and under the microscope shows signs of alteration to chlorite. The other minerals found in the rock are brown hornblende, actinolite and sometimes tremolite.

Hornblende-schists.- Outcrops of hornblende-schists are very few and far between. Mention may, however, be made of a small occurrence of amphibolite to the south-east of .235, the rock consisting mainly of green hornblende, accessory sillimanite and a few grains of topaz.

Granitic gneisses.- By far the most extensive rock formation in the area is the biotite-gneiss. The summits and slopes of the Western Ghats like the Puspagiri, Kadumkal and Jamalabad expose huge outcrops, but as one proceeds westwards, they are gradually covered over by vegetation and soil. Except for local variation (e.g., west of Kutrapadi) they have a general N.W.-S.E. to N.N.W.-S.S.E trend parallel to the direction of the Western Ghats and dip westwards on the average at 45°. The foliation direction generally conforms with the strike. Primary gneiss banding is common and the rock varies from coarse gneiss granulite to highly foliated gneiss.

They consist essentially of common vitreous quartz and acid to intermediate feldspars, the latter sometimes showing clouding and decomposition; microcline is not uncommon. The usual ferromagnesian mineral is biotite while muscovite is less frequent; green mica is sometimes seen (e.g., foot-hill .1159). The accessory minerals include apatite, spinel, diopside and rarely zoisite; pink garnet is generally abundant.

Charnockite.- Except for a small outcrop of acid charnockite in the hill .845, south of Bandi hole, charnockite are seldom seen in the area.

Basic and ultrabasic rocks.- The biotite gneisses are profusely intruded by basic and ultrabasic sills and dykes giving rise to long, more or less, narrow ridges, generally low but often rising to heights of 200 feet above the gneissic country. Mention may be made of two such long sills, one of them starting at the south-east corner of the topo-sheet 48 P/5 and running N.W. through Nujibaltila for over a distance of eight miles, while the second one starting to the north of Kuindila runs N.W. through Nyayatarpu for over a distance of eight

miles; the latter is likely to continue further north-west. A cluster of highly folded and branching dykes is seen in the Pudnur R.F. The majority of these intrusives are sills running generally N.W.-S.E. in conformity with trend of the major rock types. Some of them are also seen striking N.E.-S.W. while very few run east-west. The intrusives are less active as one proceeds westwards.

Spheroidal weathering is typical of these intrusives, covering the summits and slopes of the ridges with the rounded boulders and the surrounding country with dark soil.

Considerable variation is seen in these rocks both as regards the texture and mineral composition, the texture varying from fine granulitic to doleritic and porphyritic. They range in composition from pyroxenites to amphibolites. Except for a few prominent dolerites, they are all grouped under 'Pyroxene granulites'.

The ultrabasic varieties of these dyke rocks are essentially pyroxenites made up almost entirely of either hypersthene or augite ranging from panidiomorphic to granulitic texture; the pyroxene is often poikilitic towards the basic feldspars (approaching labradorite) e.g., the dyke along Ujre road at Netravati R section. The accessory minerals generally found are biotite, secondary hornblende and a few grains of apatite.

The majority of the intrusive rocks fall in the basic group showing in general a granulitic texture which may include fine and coarse. The essential ferromagnesian minerals include hypersthene, augite, hornblende and diopside in varying proportions. Very often hornblende predominates over the other minerals and the rock can be considered as hornblende-granulite. The plagioclase feldspars are intermediate to basic while andesine and labradorite are not uncommon. Granular aggregates of quartz are sometimes seen in considerable quantity. The accessory minerals include biotite, apatite, zoisite, magnetite and epidote. Secondary hornblende after hypersthene is very frequent. Pink garnet, sometimes appearing as phenocrysts is a common associate.

A few outcrops of more acid porphyritic types are also seen (e.g., west of hill .1212, north of Neriya). The rocks are composed of phenocrysts of very feebly pleochroic and highly altered hypersthene, the groundmass being made up of an aggregate of brown hornblende and quartz with accessory biotite and magnetite.

The cluster of highly folded and branching dykes in the Pudnur R.F. referred to earlier, is interesting. Unlike the other intrusive rocks, they consist of feebly pleochroic hornblende and basic feldspar. These are probably secondary after the original pyroxene granulites. The accessory minerals are mainly a few grains of quartz and magnetite.

The two long sills, referred to earlier, and a few smaller ones represent the dolerite type of intrusive rock showing ophitic to sub-ophitic texture; some of them are very fine-grained apparently due to sudden chilling. The rock consists essentially of augite and

eldspars (andesine labradorite) while quartz, magnetite, biotite and garnet are the accessory minerals. Hornblende is often seen in considerable quantity.

A more altered pyroxene dolerite from milestone 2/2 along Uppinangadi-Beltangadi road shows beautiful eliphitic borders, composed of mainly hornblende(?), developed between the feldspars and magnetite. The other minerals seen in the rock are augite and biotite.

Recent and Sub-Recent.- Around Kokkada, Golithattu, north of Nelliyadi, Kunthur, Kaniyur, Alankar and Koila, considerable area is capped by laterites giving more or less a flat appearance and at places giving rise to red soil on weathering. A few occurrences of clay were seen around Ujre, Koyyur and Alankar.

Structural features.- The granitic gneisses constituting the major formation of the area has a general N.W.-S.E. to N.N.W.-S.S.E. trend in consonance with the general trend of the Western Ghats, and dip westwards on the average at 45°. There are, however, local variations, as for example, a pitching anticlinal fold about a mile to the north-west of Kutrapadi.

The highly folded dyke rocks of Pudur Reserve Forests indicate a pitching syncline.

ECONOMIC GEOLOGY

The following mineral occurrences have been recorded in the area surveyed:-

1. Iron-ore.- By far the most important economic mineral occurring in the area is the iron-ore. It is well known that iron-smelting was carried out by ancients in the Puttur taluk; even to-day slag heaps can be seen at a few places. These iron-ore occurrences are associated with ferruginous quartzites which are fairly thick at the two places mentioned before. Though at places the bands grow richer in iron content due to weathering and leaching away of silica, it is doubtful if the same rich quantity of the ore continues deep down.

The following are analyses of samples collected from the surface, from the localities mentioned against each:-

Locality.	Sample No.	Insoluble. %	Total Iron as Fe %	P. %	S. %
Along Charmadi road near Lundage. ..	SK 18	39.10	39.36		
From hill .973 near Dharmasthala. ..	SK 27	44.40	38.47		
From hill .1360 near Dharmasthala. ..	SK 29	49.98	34.33		
S. of hill .1152 near Dharmasthala.	SK 34	49.70	35.02		
From hill .767 ..	SK 38	49.02	32.85		
From hill .823 ..	SK 53	49.50	34.03		
S. end of Ajjimale.	SK 57	79.32	10.06		
N. of 100 and W. of Varkal Gudde. ..	SK 60	50.04	32.05		
From the valley between .2128 & .2007.	SK 73	49.30	34.03		

Locality.	Sample No.	Insoluble. %	Total Iron as Fe %	P. %	S. %
A mile N.E. of Shiradi. ..	SK 74	34.22	41.43		
From hill E. of Kirnadka. ..	SK 80	2.62	57.88	0.103	0.023
From hill .1180 ..	SK 95 a	12.30	54.75		
3 furlongs S. of .1180. ..	SK 95 b	21.48	45.75		
6 furlongs S. of .1180. ..	SK 95 c	7.94	50.60		
N. of hill .1100, E. of Ajana. ..	SK 96	5.28	55.63	0.154	0.022
N. of Sunkadakatte.	SK 97	30.95	44.68		

It may be useful to mention here a few analyses of 'picked' iron-ore samples collected by Mr. S. Krishnaswamy, Geologist, and stated in his Progress Report for the year 1951-52.

Locality.	Fe %	Phosphorous. %	Manganese. %	Sulphur. %
From Yenakal R.F. on the S. flanks of the Muthlaje Bail.	52.22	0.044	0.192	0.048
6 furlongs E. of Ajana Bail	41.25	0.046	4.64	0.026
Samples sent by Mr. Amritha Rao, Deputy Tahsildar, from Nidle and Konaje R.F.	51.35	0.0410	0.0420	0.038
	56.30	0.011	0.172	0.024
	53.36	0.028	0.066	0.051
Eastern flanks of hill .543 S.W. of Chilimetturu village.	56.83	0.024	0.20	0.027

It is apparent from the above analyses that between the two more important iron-ore occurrences, that found in the Mujur R.F. is tolerably good. The phosphorous content of these ores is variable. The ore band has an average width of about six feet and can be traced for a distance of three miles. These ferruginous quartzites are likely to extend further north as well as south of the area mapped and detailed prospecting is necessary to assess the quality and quantity of ore available.

2. Clays.- Well-sections around Ujre and stream-sections around Koyyur show indications of a probable occurrence of china clay around those villages. Such indications are seen over an area of about one square mile at each place. These can only be confirmed after trial borings. Smaller, unimportant occurrences of china clay are seen here and there.

At Alankaru, a group of about 30 families live on pottery. Yellowish-white clay of good plasticity is seen

on the banks of Kumarahalli river over an area of a square mile and at a depth of about 3 to 4 feet. Over lying the clay is a recently deposited pebble bed. Th average thickness of the clay bed is about five feet.

3. Corundum.- Occurrences of corundum around Kemmaru i known for a long time. It is an alluvial type of depo sit found along the banks of a stream. All the availa material seems to have been removed and the chances of winning more are remote. A few pits put down by earli workers can still be seen.

4. Building material.- The granite gneisses and the laterite can best be used as building material.

Name of the locality	Latitude			Longitude		
	o	'	"	o	'	"
Ajana	12	46		75	32	
Arabata Gudde	12	47	30	75	32	
Alankaru	12	46		75	21	
Bandi Hole	12	53		75	29	30
Beltangadi	12	59	30	75	17	30
Dharmastala	12	57		75	23	
Golitattu	12	51		75	22	30
Harike	12	56		75	32	30
Kaniyur	12	41		75	19	
Kemmaru	12	49		75	20	30
Kokkada	12	52		75	24	30
Koila	12	47		75	18	
Kuindila	12	51		75	20	
Kuntur	12	47		75	22	30
Kutrapadi	12	46		75	27	30
Manjagudde	12	57		75	24	
Mithanaje	12	50		75	32	
Mundaje	13	2		75	23	
Nelliyadi	12	49		75	23	30
Neriya	13	0		75	27	30
Nidle	12	54		75	24	
Nujibaltila	12	48		75	28	
Nyayatarpu	12	56		75	16	30
Shiradi	12	49	30	75	32	
Shishile	12	54		75	30	
Sunkadakatte	12	44		75	32	30
Ujre	12	59	45	75	19	30
Uppinangadi	12	50		75	15	

95706 GOVERNMENT OF INDIA

Geological Survey of India

24, Chowringhee Road, Office/Deptt.

No. 15359 M/258(T)/54 dated the 18-11-1954

SECTION OFFICER MINISTRY OF INDUSTRIES, LABOUR AND CO-OPERATION

The undersigned is directed to acknowledge receipt of your letter / memo. No. Nil dated 27.10.54 which is receiving attention. Enclosed (P) with 10 copies of the No. 0. NOV 761 of 25.3.54 (Progress Report for 1952-53 - Geology of the Malnad portion of Puttur Taluk, South Kanara district by Mr. P. Jayappa, Asst. Geologist, Gr. I)

Q to D

May be lodged and added to the G.O. at (A)

23/11/54

27.11.54

2
24 #311

India Service Post Card

(This side reserved for address, with signature and official designation of sender)

To

The Superintendent,
Govt. of Madras,
Dept. of Industries, Labour
and Co-operation,
Fort St. George,
MADRAS.

S. 49.

N.P.—C/36/52—17-2-53 & 6811/OP/22/civil—2-5-52—35,00,000 copies.

C.No.22631 G/54. I.L.C.(G)

Sub: Mines - G.S.I. - Progress Report for the Field Season 1952-53 - Geology of the Malnad portions of Puttur Taluk, South Kanara Dt.

Ref: From the Dy. Director, G.S.I., Calcutta No. 3377 M/398(10)/52/53 B.R.C.I. dated 12.3.54.

A.S.

The Dy. Director, G.S.I. has forwarded thre copies of the progress report for the field season 1952-53 on the Geology of the Malnad portions of Puttur Taluk, South Kanara District. The report is noted below.

2. The region surveyed covers an area of about 400 sq. miles forming a major portion of the Puttur Taluk, South Kanara District. The minerals found in the area are as follows:-

1. Iron ore:- The most important economic mineral occurring in the area is the iron ore. These occurrences are associated with ferruginous quartzites which are fairly thick. Though at places the bands grow richer in iron content, due to weathering and leaching away of silica, it is doubtful if the same rich quantity of the ore continues deep down. The ore band found in Mujur R.S. has an average width of about six feet and can be traced for a distance of three miles and detailed mapping and prospecting are necessary to assess the quality and quantity of ore available.

2. Clays:- Well-sections around Ujre and stream sections around Koyyur show indications of a probable occurrence of China clay around these villages Such indications are seen over an area of about one square mile at each place. These can only be confirmed after trial borings.

Yellowish-white clay of good plasticity is seen on the banks of Kumardhari river over an

area of a square mile and at a depth of about 3 to 4 feet. The average thickness of clay bed is about five feet.

3. Corrundum:- Occurrences of corrundum around Kammaru is known for a long time. It is an alluvial type of deposit found along the banks of a stream. All the available material seems to have been removed and the chances of winning more are remote.

4. Building material: The granite gneisses and the laterite can best be used as building material.

3. The report may be published in the Fort St. George Gazette for information of the public.

A draft order is submittedx below for approval.

3/3/54 G
23/3/54

D/ 24.3.54. S. 23

MINES--G.S.I--Progress Report for the Field Season 1952-53--Geology of the Malnad portions of Puttur Taluk, Southern Kanara District by Sri B.R.C.Iyengar--Printing of maps

From the C.S.&.P. No.Pr.106344/744 Pub dated 29-9-54

-****-

Please see the letter from the C.S.&.P. Madras at p.27.c.f.

2. In G.O.Ms.No.761 ILC dated 25-3-54, the G.S.I. reported on the Geology of the Malnad portions of Puttur Taluk, South Kanara district was ordered to be published in the F.S.G.G. The C.S.&.P was asked in Memo No.35372 G/54-4 dated 3-5-54 to print 100 copies of the G.O. Along the G.S.I.report, two maps at (A) pertaining to the area were received as enclosure.

3. The Assistant Director of Survey, who was consulted by the C.S.&.P regarding printing of the maps as appendix to the report, has reported that the maps at (A) received from the Superintending Geologist, G.S.I. are not suitable for reproduction as they are coloured and that therefore they have to be drawn afresh. He has also stated that the estimated cost of redrawing the two maps, reproducing and supplying 100 copies works out to Rs.945/- . He has therefore enquired whether the above terms are acceptable. The C.S.&.P. has submitted a copy of letter from the Asst.Director of Survey for orders of the Govt.

4. It will be seen from the G.S.I. report at pp.9-19.c.f.(S) that no specific reference has been made to the maps in it and that the report is self-contained even without the maps. It does not therefore seem necessary to print the maps at a cost of Rs.945/-. In the circumstances, it is for orders whether the C.S.&.P. may be informed that the maps need not be printed and that the printed copies of the G.O. alone (without the maps)

may be supplied at an early date.

Subject to orders, a draft Memo is submitted.

15/10/54 15.10.54 17/10/54 DS. 18/X

Issued as Memo No. 35372/54-B

15. Printed copies of G.O No. 761 S.L.R dt 25/2/54 have been read from the Press and copies have been despatched to the addressees as noted in the Press Slip at (R).

No further action is called for. The papers may be lodged and added to the G.O at (S).

16.11.54. 17/11/54

Sectt. II-2—5,506—15-11-47

PRESS SLIP.

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143A / 71

&C. DEPARTMENT.

353729/54

dated 194

G.O. No. 761 dated 25/3/1954

Number of MS. pages sent (b) Correspondence 11 (c) Notes —

Brief subject: G.S.I. Progress Report on the geology of the Salad portions of Pudhur Taluk, S. Kanara Dt.

Publication and Printing

(d) Number of copies required when struck off (*not including copies for volumes and editors' table which are retained in the Press*). (1)	"Press" copies to supply on requisitions for purchase by the public. (2)	Complete correspondence and orders. (3)	Notes. (4)
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28/7/54

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Dept. of Industries, Labour & Co-operation, Madras

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P. Anbalagan 29/7/54
Assistant Secretary to Govt.

28/7/54 29/7/54

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